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Charge Structure of the Combined System $(La_{0.6}Sr_{0.4}MnO_3)_{0.7}(La_{0.6}Sr_{0.4}FeO_3)_{0.3}$ as Investigated by Mössbauer Spectroscopy

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The charge structures of $La_{0.6}Sr_{0.4}FeO_3$ (LSMO) and of the combined system $(La_{0.6}Sr_{0.4}MnO_3)_{0.7}(La_{0.6}Sr_{0.4}FeO_3)_{0.3}$ are investigated by using Mössbauer spectroscopy. The antiferromagnetically ordered $La_{0.6}Sr_{0.4}FeO_3$ (LSFO) has possible charges of Fe^{3+} and Fe^{4+}, which include a low-spin Fe^{4+} state at and above 230 K. The temperature dependences of the Mössbauer spectra for the $La_{0.6}Sr_{0.4}FeO_3$ system and for the combined $(LSMO)_{0.7}(LSFO)_{0.3}$ system are fitted as three sets of Zeeman patterns corresponding to Fe^{3+} and Fe^{4+} below 230 K. At and above 230 K, the fitted Mössbauer spectra for the combined system are the same in all temperature ranges. Above 230 K, $La_{0.6}Sr_{0.4}FeO_3$ spectrum consists of two sets of six Lorentzians for Fe^{3+} and one line for low spin Fe^{4+}. It is worth noting that large fields are induced in the combined system.

Key words : Combined system, Mössbauer spectra, $(La_{0.6}Sr_{0.4}MnO_3)_{0.7}(La_{0.6}Sr_{0.4}FeO_3)_{0.3}$